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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,450	08/27/2003	Arthur E. Dixon	58305.0007	9643

24629 7590 04/06/2006

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EXAMINER	
CONSILVIO, MARK J	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/648,450	DIXON ET AL.	
	Examiner	Art Unit	
	Mark Consilvio	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) *9-12,29 and 30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,13-28 and 31-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/19/2006 has been entered.

Status of Claims

Claims 9-12, 29, and 30 were previously withdrawn. Claims 1-8, 13-28, and 31-42 were previously rejected and claims 1, 41, and 42 are newly amended. Claims 1-42 are currently pending.

Claim Objections

Claims 9-12, 29, and 30 are objected to because of the following informalities: The status identifiers of the claims incorrectly identify the claims status as "original." The claims should properly be identified as "(Withdrawn)" or "(Previously Withdrawn)." See MPEP §1.121. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 8, 14, 16/1, 16/2/1, 16/3/1, 17/1, 17/2, 17/3, 17/6, 18/1, 18/2/1, 18/3/1, 19/1, 19/2/1, 19/3/1, 20/1, 20/2, 20/3, 20/6, 21/1, 21/2/1, 21/3/1, 23/1, 23/2/1, 23/3/1, 24/1, 24/2/1, 24/3/1, 26/1, 26/2/1, 26/3/1, 27, 39/1, 39/2/1, 39/3/1, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dixon et al. (US Patent No. 5,532,873) in view of Engelhardt et al. (US Patent No. 6,909,540) and Smith (*Modern Lens Design*, 1992).

With respect to claim 1, Dixon et al. discloses an imaging system for imaging objects, said system comprising: (a) an illumination source (102) producing a light beam (103) directed upon an optical path toward an object (130); (b) a scan lens (400) for focusing said light beam to a diffraction-limited configuration in a prescribed object plane, (c) a scanner (114, 120) for scanning said light beam to move said diffraction-limited configuration in a pre-determined scan pattern on said object plane (col. 4, lines 38-62); (e) a focusing lens (108, 136, 200, etc.); and (f) a detector (140) located to receive light from said object plane and a display (412) to produce a signal from said detector (fig. 4a). Though Dixon et al. teaches a focusing lens may be placed at different positions depending on the focal length of the lens used, Dixon et al. does not expressly disclose said scan lens being movable relative to said object to achieve coarse focusing or a focal lens being movable relative to said scan lens to achieve fine focusing or said scan lens having an external entrance pupil located at the scanner.

However, the moving of lenses for coarse and fine focusing of a microscope is old and well known in the art. Engelhardt et al. teaches an objective lens system for a confocal scanning microscope wherein an objective lens is movable relative to an object to achieve coarse focusing and suggests a focus lens is moved relative to a scan lens for fine focusing (figs. 1-3 and col. 5, lines 5-8). Though Engelhardt teaches that all the lenses of the objective system may be moved, Engelhardt also suggests a smaller subset of the lenses of the objective system may be moved relative to the other lenses of the system (col. 1, lines 53-56 and col. 5, lines 21-27 and lines 60-65). In fact, Engelhardt suggests that the smallest number of moving lenses would be most desirable for rapid adjustment (col. 3, lines 62-66). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Dixon et al. and Engelhardt et al. to provide a scan lens being movable relative to said object to achieve coarse focusing and a focal lens being movable relative to said scan lens to achieve fine focusing for the microscope of Dixon. One of ordinary skill would have been motivated to do this for the advantage that "because of the small masses being moved, both rapid scanning of a specimen in the Z direction (along the optical axis) and rapid focusing are enabled" (Engelhardt col. 3, lines 62-66).

Further, Dixon does not expressly disclose a scan lens external entrance aperture located at the scanner. However, Smith teaches this to be a standard arrangement for scanning systems (p. 411). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to further combine the teachings of Dixon et al. and Smith to provide such a scanning arrangement. One of ordinary skill would have been motivated to do this "[t]o

minimize the size of the scanning mirror" (Smith p. 411) allowing the system to be more compact and less expensive.

With respect to claim 2, though Dixon and Smith are silent to a fixed scan lens during fine focusing, Engelhart et al. suggests the scan lens is in a fixed position relative to said object during fine focusing in that any of lens 7, 9, 11 or combination thereof could be chosen to move relative to lens element 13 (col. 4, lines 60-65). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Dixon et al. and Engelhardt et al. to fix the position of the scan lens relative to the focusing lens to minimize the number/mass of moving elements.

With respect to claim 3, the combination of Dixon et al., Smith, and Engelhardt et al. suggests a focusing lens located between the object (130) and the light source (102) (fig. 3a).

With respect to claim 4, the combination of Dixon et al., Smith, and Engelhardt et al. suggests the focusing lens is located between a light source (2) and a detector (3). Here, since it is generally understood that the figures show a schematic of the optical arrangement, location is read to follow the path of the light beam. Thus, the path of the light beam begins with the illumination source and ends with the detector as shown in both Dixon et al. (fig. 3a) and Engelhardt et al. (fig. 3).

With respect to claim 5, though the combination of Dixon et al., Smith, and Engelhardt et al. does not expressly disclose the focusing lens is located between a detector and a scanner, such arrangements are well-known in the art. For example, if the combination were modified to include a standard transmission-type arrangement with detection down stream from the specimen and objective, the focusing lens as suggested by the combination would be located between the

scanner and detector. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Dixon et al., Smith, and Engelhardt et al. to provide this arrangement to add to the versatility of the microscope for application such as photoluminescence (See, for example, Dixon (US Patent No. 5,386,112).

With respect to claim 8, Dixon et al. discloses the system is a confocal imaging system and there is a detection arm (138, 136) located between said scanner (114, 120) and said detector (140), said detection arm receiving light from said diffraction-limited configuration in said object plane, said detection arm having a pinhole (138) and a focusing lens (136) to obtain a focal point for confocal detection of said light returning from said object, said detector being located behind said pinhole, there being a beamsplitter (112) located between said detection arm and said object, said beamsplitter directing light returning from said object into said detection arm (fig. 3a).

With respect to claim 14, though Dixon and Smith are silent to allowing fine focusing during operation, Engelhardt et al. discloses the system is constructed to allow fine focusing during operation of a system to image an object (col. 2, lines 51-56). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Dixon et al. and Engelhardt et al. to allow for fine focusing to be able to carry out continuous depth discrimination (abstract).

With respect to claim 16, Dixon et al. discloses the scan lens (400) is a telecentric f*theta scan lens (fig. 4a).

With respect to claim 17, Dixon et al. discloses the detector can be a spectrally resolved detector (col. 3, lines 34-46).

With respect to claim 18, Dixon et al. discloses there are means for supporting (208) said object (130) to be imaged (fig. 3a).

With respect to claim 19, Dixon et al. discloses there is a support (208) for said object (130) to be imaged, said support being capable of moving said object relative to said system (col. 3, lines 4-5).

With respect to claim 20, while Dixon et al. does not expressly a second condenser lens and transmission detector, such transmission arrangements are well known in the art and often interchanged with reflection arrangements. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the reflection system of Dixon et al. to provide the necessary components for a transmission system including a condenser lens and transmission detector. One would have been motivated to do this for imaging of transparent or partially transparent samples.

With respect to claims 21 and 39, Dixon et al. discloses said illumination source (102) is a laser (fig. 3a).

With respect to claim 23, Dixon et al. implies the system is configured to be controlled by a computer (col. 4, lines 58-63).

With respect to claim 24, Dixon et al. discloses the imaging system is a macroscope and said system can be operated to image an object in reflected light, transmitted light, fluorescence, photoluminescence or multi-photon fluorescence (abstract).

With respect to claim 26, Dixon et al. discloses said diffraction-limited configuration is one of a spot or a line (col. 4, lines 46-49).

With respect to claim 27, Dixon et al. discloses said system has a beam expander (104, 106, 108), said beam expander being located to expand said light beam prior to said light beam entering said beamsplitter (112) (fig. 3a).

With respect to claim 41, the combination of Smith, Engelhardt, and Dixon suggests an imaging system having an illumination source producing a light beam directed along an optical path towards said object, a scan lens having an external entrance pupil for focusing said light beam to a diffraction-limited configuration in a prescribed object plane, a scanner for scanning said light beam to move said diffraction-limited configuration in a pre-determined scan pattern on said object plane, a detector being located to receive light from said object plane and a display to produce a signal from said detector, as discussed supra regarding claim 1. Further, the combination would suggest to one of ordinary skill a method comprising locating said entrance pupil at said scanner (as taught by Smith), moving said scan lens relative to said object to coarse focus said system (as taught by Engelhardt), subsequently maintaining said scan lens in a fixed position relative to said object and moving a focusing lens relative to said scan lens to fine-focus said system (as understood by one of ordinary skill and as taught by Engelhardt). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Dixon et al., Smith, and Engelhardt et al. to include the steps of locating said entrance pupil at said scanner, moving said scan lens relative to said object to coarse focus said system, subsequently maintaining the scan lens in a fixed position relative to the object and moving a focusing lens relative to the scan lens to fine-focus the system to allow the system to rapidly refocus and quickly scan an object (Engelhardt col. 3, lines 62-66).

With respect to claim 42, the combination of Dixon et al., Smith, and Engelhardt et al. discloses or suggests the limitations of claim 42 as discussed supra regarding claim 41. The combination further discloses the imaging system having a laser as an illumination source. While the combination is silent to the intensity of said laser being controllable, such control is inherent to all laser systems since some degree of control over intensity can always be exhibited by switching the laser on and off. Also, the examiner notes that the limitation, "to use said system as an imaging system and as a laser guided surgery or microsurgery system" is an intended use type limitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claimed limitation. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Claims 6/4/1, 6/5/1, 7, 15/1, 15/2/1, 15/3/1, 22/1, 22/2/1, 22/3/1, 28, 31/1, 31/2, 31/3, 31/6, 32/1, 32/2/1, 32/3/1, 33/1, 33/2/1, 33/3/1, 34/1, 34/2/1, 34/3/1, 35/1, 35/2/1, 35/3/1, 36/1, 36/2, 36/3, 36/6, 37/1, 37/2, 37/3, 37/6, 38/1, 38/2, 38/3, 38/6, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dixon et al. (US Patent No. 5,532,873) in view of Engelhardt et al. (US Patent No. 6,285,019) and Smith (*Modern Lens Design*, 1992) and in further view of White et al. (US Patent No. 6,169,289).

With respect to claims 6 and 40, the combination of Dixon et al., Smith, and Engelhardt et al. discloses all the limitations of claims 4 and 5. Neither reference specifically discloses the imaging system is a multi-photon or two-photon system. However, White et al. discloses a

multi-photon or two-photon system may be used for florescence microscopy. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the teachings of White et al., Dixon et al., Smith, and Engelhardt et al. to provide an imaging system capable of multi-photon or two-photon excitation for the best imaging of fluorescent objects.

With respect to claims 7 and 25, while Dixon et al., Smith, and Engelhardt et al. are silent to an oil or water immersion lens, White et al. discloses a laser scanning confocal microscope having an objective lens that may be a oil or water liquid-immersion lens and shows there is an immersion liquid between the lens and the object when the system is operational (fig. 1, col. 6, lines 44-46, and table 1). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Dixon et al., Smith, and Engelhardt et al. with the arrangement of White et al. "to enhance the collection of the fluorescent photons from the specimen..." (col. 6, lines 8-9).

With respect to claim 15, Dixon et al. discloses the scan lens may be a telecentric f*theta scan lens (400) (fig. 4a). The modification to a liquid immersion scan lens has been described supra regarding claim 7.

With respect to claims 22 and 28, though Dixon et al., Smith, and Engelhardt et al. are silent to a laser rejection filter and multi-photon imaging system, White et al. discloses a laser rejection filter (not shown) is placed in front of a detector (35), an imaging system being a multi-photon or two-photon imaging system whereby an illumination source (11) is a short pulse laser to excite multi-photon or two-photon fluorescence respectively in an object (22) (col. 5, line 47-col. 6, line 45). At the time the invention was made, it would have been obvious to a person of

ordinary skill in the art to modify the teachings of Dixon et al., Smith, and Engelhardt et al. with the arrangement of White et al. to provide maximum resolution for the imaging system.

With respect to claims 31-35, White et al., Dixon et al., Smith, and Engelhardt et al. disclose all the limitations of claims 1-3 and 6 and variety of possible uses for the imaging system. The combination as disclosed above teaches or suggests all the structure needed to meet the limitations of claims 31-35. The examiner notes that these claims include limitations that are intended use-type limitations. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claimed limitation. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

With respect to claims 36-38, Dixon et al. discloses the light source is a laser and the object is a semi-conductor. The White et al. teaches a laser intensity being adjustable and controllable for a multi-photon or two-photon system (col. 2, lines 51-67). (See the reject supra regarding the further intended use-type limitations.) Though the references are silent to the photon energy being related to bandgap energy of a semi-conductor, it is well known that a photon energy smaller than the bandgap energy may be used in multi-photon illumination. Therefore, at the time of the invention, it would have been obvious to one of ordinary skill to provide this photon energy for proper imaging of a semi-conductor sample.

Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dixon et al. (US Patent No. 5,532,873) in view of Engelhart et al. (US Patent Application No.

2003/0103263) and Smith (*Modern Lens Design*, 1992) and in further view of Richards-Kortum et al. (US Patent No. 6,370,422).

With respect to claim 7, Dixon et al., Smith, and Engelhardt et al. teach or suggest all the limitations of claim 1 as stated supra. Dixon et al., Smith, and Engelhardt et al. are silent to the limitations of claim 7. Richards-Kortum discloses a liquid immersion scan lens (36) and there is an immersion liquid (88) between said scan lens and an object (20) when said system is operational (figs. 12, 15, 16, 24). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Dixon et al. with the arrangement of Richards-Kortum to provide a larger numerical aperture and reduce undesired reflection improving the image quality.

With respect to claim 13, though Dixon et al., Smith, and Engelhardt et al. are silent to a sidewall having a sealing relationship with an immersion liquid, Richards-Kortum shows a sidewall surrounding a scan lens (36), said sidewall extending between said scan lens (36) and an object (20), said sidewall having a substantial sealing relationship with said scan lens and said object to retain said immersion liquid (88) of said liquid-immersion scan lens between said scan lens and said object (fig. 24). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the teachings of Dixon et al., Smith, and Engelhardt et al. to provide a sidewall to contain the immersion liquid. One would be motivated to do this to allow for containment of the immersion liquid.

Response to Arguments

Applicant's arguments with respect to claims 1-8, 13-28, and 31-42 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Consilvio whose telephone number is (571) 272-2453. The examiner can normally be reached on Monday thru Friday, 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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